

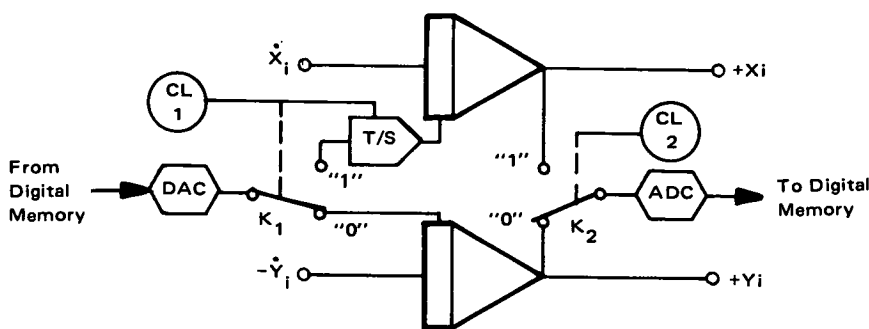
NASA TECH BRIEF

Marshall Space Flight Center



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An Improved Data Transfer and Storage Technique for Hybrid Computation



An improved technique has been developed for transferring and storing data at faster than real time speeds on a hybrid computer. This technique was developed for use with advanced control systems which require reduced sensitivity to adverse operating conditions. The technique uses one analog circuit for multi-operating conditions (see figure). The predominant advantage of this technique is the combined use of the electronic relays, track and store units (T/S), and analog-to-digital (ADC) and digital-to-analog conversion (DAC) units of a hybrid computer to increase data transfer and storage capabilities.

The state variables, x_i , y_i , (see figure) are integrated in real time until t_1 . The values of x_i and y_i are sampled using control line 2 (CL 2) and stored in the digital memory. These stored values of x_i and y_i become the initial conditions for high speed repetitive runs from t_1^* to t_2 . When control 1 (CL 1) is set equal to a logic one, the value of x_i at t_1 is sent from digital memory through the DAC to the track and store amplifier. With CL 1 equal to zero, the negative value of y_i is sent from digital memory to the DAC. The track and store amplifier and the DAC hold the values of x_i and y_i at t_1 , thus, becoming the initial conditions for the high speed repetitive runs from t_1 to t_2 . The locations in memory where these state variables are stored are then assigned by block to the two simulated conditions.

Fewer analog components are required to obtain values of the state variables to be used as initial conditions. The use of digital memory for storage allows the program to remember sets of initial conditions for each simulated condition under study without any additional analog hardware. The primary feature of this technique is the use of digital memory to store sets of initial conditions and the resulting reduced requirements in analog hardware.

Note:

Requests for further information should be directed to:

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NASA has decided not to apply for a patent.

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